Puzzle Storage Chair: Multifunction Furniture

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Abstract

This study is focusing on Puzzle Storage Chair. The main material of this furniture is blockboard. Blockboard is a wood based panel that is light in weight. Blockboard makes the product easy to move and handle. It is also easy to nail and screw during manufacturing. Puzzle Storage Chair has three functions. The functions of this furniture are mainly for seat, table and bookcase. The concept of this furniture called puzzle, because of the arrangement of furniture parts. This furniture can be turn to computer table by pulling the seat upward and push the bookcase forward. Puzzle Storage Chair is made for limited spaces for living room. Based on survey, data on 100 respondents, about 92% of them agreed with the design of Puzzle Storage Chair

Keyword: blockboard, save space, multifunction furniture.

1. INTRODUCTION

The world was rapidly changing as new technologies were developed (Lang, 2001). The technology was made people life easier. It's helping human in furniture industry to produce new furniture design. Furniture is an object of wood parts or any other materials that combined to make people perform their life easier. Furniture can be made from wood, glass, plastic or metal. Besides that, furniture can be produce by a combination with wood and plastic, plastic and metal or metal and plastic. A good furniture design just makes sense; furniture should serve the purpose it was created with the best possible performance, built to last, and using materials that are pleasing in his eyes and hands (Lang, 2001).

Nowadays, a bunch of furniture in the market comes out with a unique design that maybe does not cross in our mind. The design looks complicated in term of shape but it can be done by specific machine such as scroll saw that capable cut curve and edge that increased to a higher level as well as the technology. Besides that, a great machine could not create a best product if the designer lack of knowledge about machine capabilities. Wood based panel are become popular in the furniture industries. Wood based panel can make product become more attractive. Designer should create a proper design to produce some aesthetic value on furniture product. It is included the size of the product. The size should be easy to handle. You need to figure out about size and configuration once you decided what kind of table or chair to be made (Engler, 1995).

2. MATERIALS AND METHODS

2.1 Raw Material Preparation

Blockboard the main material used to produce this product. Formica, fasteners, edge bending. I also using elastomeric adhesive that is contact adhesive (CA) to complete edge bending and formica. All these materials were supplied by workshop Industri Perkayuan, UiTM Pahang.

2.2 Methodology

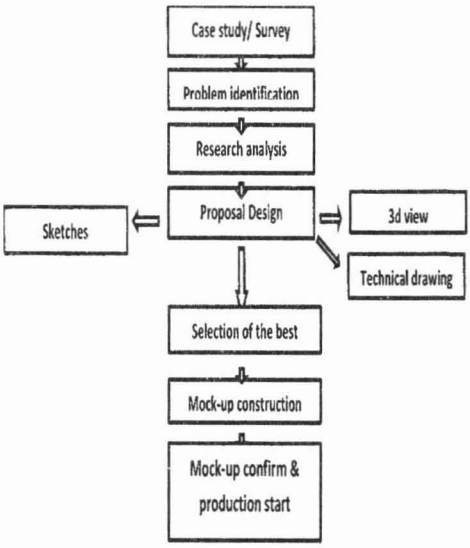

Figure 1: Methodology

2.2.1 Case study / survey

First and foremost, the process of design is started from case study and survey about design. In this level, the

furniture design and function was studying to define objective of the project. Survey is carry on to gather information about design of furniture to make sure the design is acceptable by customers. In this level, puzzle storage chair is proposed to be design. The identification of the problem is important before manufacturing process. Designer has to identify expected problem that might occurs when the production is start. Designer have to justify and study whether the main material can endure loads applied. Wood based panel is the best material for indoor furniture. It has good characteristic of material aspect such various colours, easy to screws or nails and dimensional stable.

2.2.2 Problem identification

Next, we need to identify any problem occur when we start designing our product. We need to determine the objective of the product to be produced, the product advantages, and weaknesses.

2.2.3 Research analysis

Then, once the problems have been identified, we need to do some research analysis about our product design. Research is carry on to gather information about design of furniture to make sure the design is acceptable by customers.

2.2.4 Produce design

In this process designer will illustrate their design in two dimensions that is 2D and 3D. Designer can implement their design using AutoCAD or Google Sketch up. According to Ernest Joyce, computer have become a good tools to assistance people in financial management and controlling stock system, but now this technology has helped human in preparing drawings. The product design has been illustrate using 2D and 3D design. Sketch design shows on (Figure 2) and 3D design is on (Figure 3).

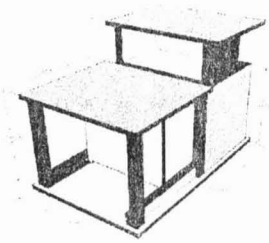

Figure 2: Sketch drawing

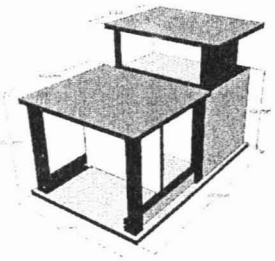

Figure 3 : The Dimension (3-D) view

2.2.5 Design confirm

After that, we need to confirm the best design to produce. The selection of the product design should be achieving the both objective save space of living room and to apply multifunction design using blockboard as main material.

2.2.6 Mock-up construction

Once the design has been confirmed, the construction of mock-up is applicable. Mock-up is important to make sure that we can analyse the product weakness before start manufacturing the real product. Mock-up is constructed using a specific lower scale compared to original size of the product. Mock-up is constructed using polystyrene.

2.2.7 Mock up analysis

Then, mock-up need to be analysing to make sure the objective the product design can be achieved.

2.2.8 Mock up confirm

When mock-up is done with analysis, the mock up will be conforming by supervisor and the process to produce the original product can be start.

2.2.9 Production start

Once it confirmed by supervisor, the production of the prototype is able to start. The product is constructed using lesser material compared to real material.

2.3 Final product Preparation

The main material of the product manufacturing is blockboard. The design is following the real material and real size of the product. The final manufacturing process is able to start. It is started with cutting planned.

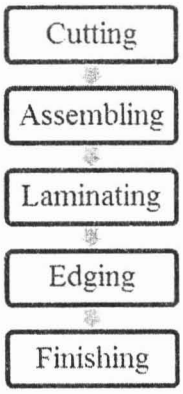

Figure 4: Product Preparation Flow Chart

2.3.1 Cutting process

Firstly, board need to be measure into specified length using measuring tape. The efficient of production is depending on the preparation of tools. The tools used are pencil, measuring tape and L-square. Then, board are cut into specified length and width. The appropriate unit to measure length are centimetre and inch. Process of cutting is done by table saw.

2.3.2 Assembling process

When cutting process is completed, furniture parts are able to assemble. Furniture parts are ready to join together to become complete furniture. Mechanical fastener such as screw is suitable to joint furniture. Size of suitable mechanical fastener is about 20 to 22 millimeters to join the furniture component. Process of jointing is done by driller.

2.3.3 Laminating process

After all parts of furniture have assembled, furniture now is ready to be laminating using Formica. Process of laminating is done by wiping adhesive on both surface of furniture and Formica. The adhesive used is elastomeric adhesive. Excessive for mica on the edge of furniture can be remove using portable router and also can be remove manually using L-shape.

2.3.4 Edging process

After screwing, the puzzle storage chair is ready to undergo edging process. Edging is attached to rough edge of blockboard. Edge of blockboard is applied using white edging colour. Edging is applied using Elastomeric Adhesive or mostly known as contact adhesive (CA). Contact adhesive (CA) is applied at the edge of blockboard using a piece of Formica 7 x 10 centimetres. After a minute, edging is able to apply when the adhesive become sticky.

2.3.5 Finishing process

Lastly, edging of furniture is trimmed using knife or L-square. It is important to trim edging to provide better edge of puzzle storage chair. Excessive adhesive on furniture will make it less attractive. So, over adhesive have to be clean to provide beauty on furniture. Over adhesive can be clean using thinner.

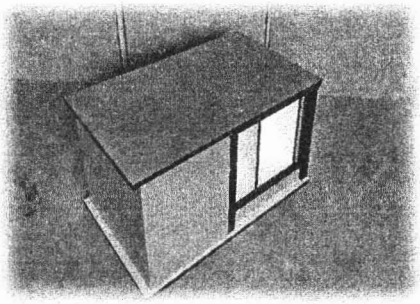

Figure 5 :Final Product

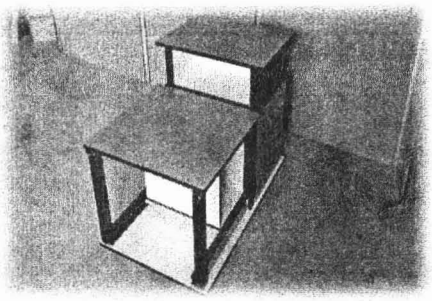

Figure 6: Multifunction puzzle storage chair

2.4 Bill of material (BOM)

Bill of materials or commonly known as BOM can define products as they are designed of the product. It contains all of material and cost consumed during production process. Table 1 shows that BOM of puzzle storage chair.

Table 1: Bill of Material

2.5 Questionnaire

A set of questionnaires was distributed to three types of profession which are Uitm staff, student and others. Their feedback used to make analysis, discussion and recommendation to the product and to make sure the

objective of this product will achieve or not. The questionnaire is shown in Appendix 2.

3. RESULTS

Table 1 showed the result of customer satisfaction of puzzle storage chair nine dependent factors which are material, concept, aesthetic space, quality, portable, multifunction, commercial and price.

Table 2: ANOVA table

Sources	df.	Material	Concept	Aesthetic	Space	Quality	Portable	Multifunction	Commercial	Price
Gender	1	0.103n.s	0.639n.s	0.068n.s	0.101n.s	0.035*	0.854n.s	0.152n.s	0.000**	0.478n.s
Age	2	0.781n.s	0.083n.s	0.396n.s	0.609n.s	0.89n.s	0.245n.s	0.460n.s	0.075n.s	0.030*
Profession	2	0.090n.s	0.000**	0.647n.s	0.000**	0.000**	0.001**	0.269n.s	0.453n.s	0.016n.s

P<0.01 highly significant**, P<0.05 significant*, P>0.05 not significant n.s

Based on table 2, it shows that between male and female there is two significant differences on quality of the product and about commercial factor. In term of quality, female customer might have a little knowledge about product quality because they do not understand about the material used. Male customer might be exposed to this material, so they are more understood to this blockboard quality.

4. DISCUSSIONS

4.1 Gender

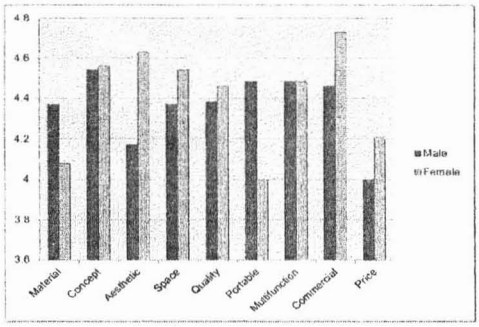

Figure 7: Gender

Figure 7 shows that there are some significant differences between male and female on material used, the product colour, easy to move and handle. The significant differences can be assumed as female correspondents do not understand well about product material used and they do not have a better energy compared to male that agreed with the product that is portable. Female correspondents is attracted to this colour makes them to have a significant difference with male correspondents.

4.2 Age

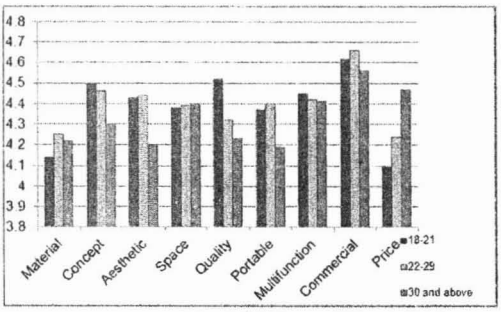

Figure 8: Age

Figure 8 show the level of satisfaction of the product based on difference category of ages. The categories of ages are 18 to 21, 22 to 29 and 30 and above. It can be considered that the design is suitable for age because there just a little bit significant difference based on ages. Most of them agree with the product performance.

4.3 Profession

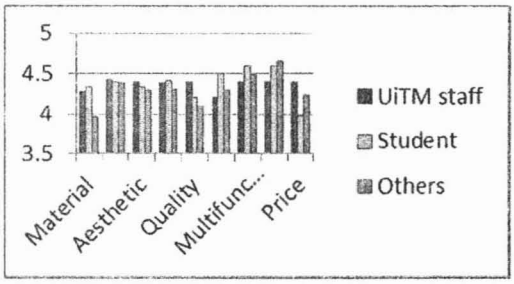

Figure 9: Profession

Figure 9 shows the level of satisfaction about the product performance on 9 different factors based on three professions. Three types of profession are Uitm staff, student, and others. Most of them agreed with the product material, concept, aesthetic, space, quality, portable, multifunction and product commercial. However most of the students seem not to agree about the product price, I assumed that they do not have sources of income to buy this product. They might think the product is too expensive to them to own it. I can conclude that most of my correspondent agrees with my product capability to be commercializing in the furniture market.

5. CONCLUSIONS AND RECOMMENDATIONS

The objective of this project is successfully save space for living room. This product can provide a better space for user. The survey has been evaluated by 100 respondents; most of the respondents gave a positive feedback on Puzzle Storage Chair. This product has been evaluated based on material, concept, aesthetic, space, quality, portable, multifunction, commercial and price. Most of them agreed with the design of Puzzle Storage Chair that is multifunction and can save space of living room. On the other hand, blockboard is a good material for this multifunctional product. Although blockboard is lower in strength compared to solid wood, it can produce a good strength of product when applied with a suitable joint. The product is easy to handle and move to anywhere user wants. Last but not least, blockboard is a suitable material for puzzle storage chair because it is dimensional stable and has a good appearance.